Occupational Valley Fever

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Impact and Control of Valley Fever

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“There are many handicrafts and arts which cause those who exercise them certain pains and plagues.”

– Hippocrates, 5th century BC

Occupational valley fever

- First case ever described: Argentine soldier in 1892
- Laboratory exposures: accidental exposures
- Environmental exposures
  - People who work outdoors and disrupt soil or work in dusty/windy conditions
  - Agricultural, construction, archaeology, military, oil and gas workers, wildland firefighters
- Review of 47 valley fever outbreaks worldwide with 1,464 cases, 1940–2015
  - 25 (53%) outbreaks associated with occupational exposures
    - Military (11 outbreaks, 442 cases)
    - Construction (7 outbreaks, 247 cases)
    - Archaeology/field studies (7 outbreaks, 92 cases)
    - Laboratories (4 outbreaks, 28 cases)

CDPH

Freedman et al. EID. 2018.

Factors that may influence transmission

Workplace Factors

- Characteristics
- Practices
- Processes
- Controls in place

Worker Factors

- Individual immunity and susceptibility
- Impaired immunity, personal risk factors
- Socioeconomic, cultural, and language factors

Valley fever among military members

- More than 350,000 military personnel stationed at bases within endemic regions
- Multiple outbreaks and sporadic cases dating back to World War II
  - Newcomer enlistees with no prior immunity
  - Dusty training exercises, operations
  - Endemicity of area
- 574 incident cases among active component service member, 2007–2017
  - Location: California (47.3%), Arizona (32.5%)
  - Overall crude incidence rate: 3.9 cases per 100,000 person years
  - Highest rates among ≥40 years, Navy, enlisted, Asian/Pacific Islanders
  - Occupation: highest among healthcare personnel (4.7), lowest among infantry/artillery/combat engineering (1.7), armor/motor transport (1.8)

CDC

Williams et al. MSMR. 2018.

Valley fever at 2 California state prisons

- Identified 103 confirmed cases among employees from 2009–mid 2013 from surveillance reports and employee rosters
- Crude annual incidence:
  - 1,039 cases/100,000 employees for prison A
  - 511 cases/100,000 employees for prison B
- Employees potentially exposed to *Coccidioides* in outdoor and indoor workplace and outside of work
- 1/3 of interviewed employees reported soil disruption activities during job

de Perio et al. EID 2015

Photos from CDCR

Valley fever among workers constructing solar farms

- 44 cases among 3,572 employees at 2 solar farms, 2011–2014
  - Incidence rate: 5,618 cases per 100,000 person years
  - Occupations: electrician (33%), heavy equipment operator (26%)
  - 58% reported frequent soil-disruptive activities
- Follow on case control study in December 2014
  - Compared 89 workers with clinical coccidioidomycosis to 325 asymptomatic workers
  - Risk factors: frequently being in dust cloud/storm, active digging, working in ditch/trench, operating heavy machinery
  - Protective factor: frequently wetting soil before activity
- 9 cases among 2,410 employees at solar farm, 2016–2017
  - Incidence rate: 1,095 cases per 100,000 person years

Wilken et al. EID. 2015

Cooksey et al. AJPH. 2017

Laws et al. MMWR. 2018

Valley fever among wildland firefighters

- Outbreak among inmate wildland firefighters in CA in 2017
  - 10 case patients, 2 hospitalized
  - Risk factors: cutting fire lines with ax tool, being in dust cloud/storm
  - Few reported training, none reported wearing respiratory protection
- Outbreak among wildland firefighters in CA in 2021
  - 3 confirmed cases, 2 hospitalized
  - Involved in digging trenches and mopping up fire with heavy dust exposure without respiratory protection

- Challenges: hand crews, dusty conditions, respiratory protection and flammability, heat stress

Laws et al. AJIM. 2020
Donnelly et al. MMWR. 2022

Valley fever among Hispanic farmworkers

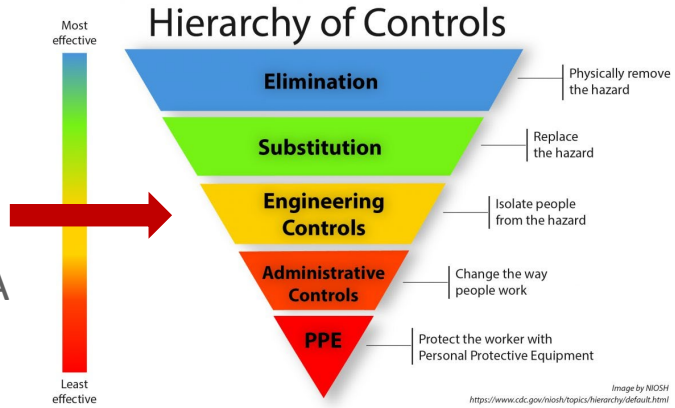
- Case control study of Hispanic farm workers in Kern County, CA, 2016- 2018
  - Compared 110 cases with positive serology to 93 controls
  - Risk factors: self reported dust exposure, work with root/bulb vegetable crops
  - Protective factors: leaf removal
  - Median 18 days lost work time
- Survey of 119 Hispanic farm workers in Kern County, CA in 2017
  - 73% aware of valley fever
  - Misconceptions: VF associated with pesticide exposure or contaminated food or water, caused GI symptoms, transmissible person to person, prevented by bandana masks
  - Concerns: inability to take off work when ill, lack of health insurance
  - Preferred source of health information: TV, family/friend/coworker, physician/healthcare provider

McCurdy et al. EID. 2020.

Sipan et al. J Agromed. 2022.

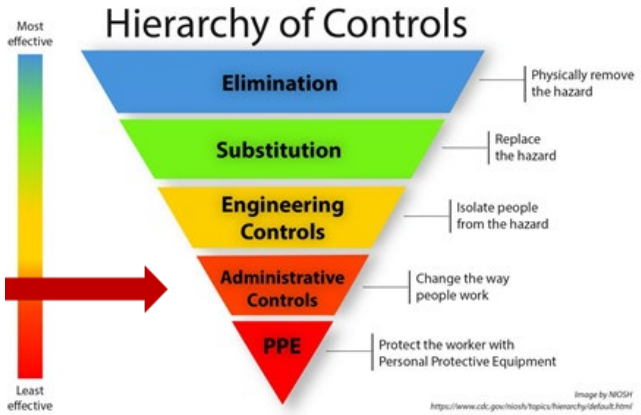
Recommendations: Engineering Controls

- Implement dust suppression methods: wet soil, stabilize disturbed soil, use soil binders, cover excavated soil
- Reduce grading, need for trenching
- Use heavy equipment with enclosed cabs and HEPA filters
- Plant vegetation, trees, lawn



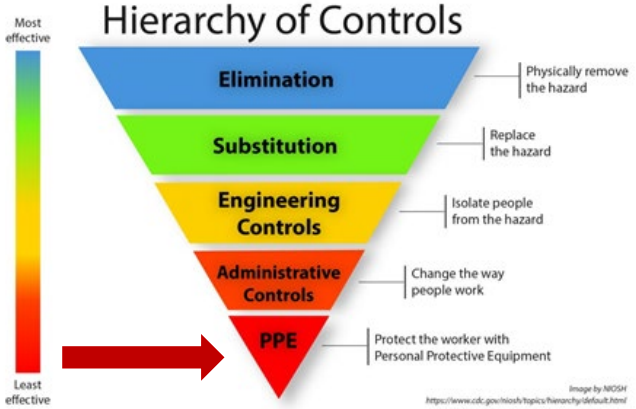
Recommendations: Administrative Controls

- Provide training to employees (CA Assembly bill AB203)
- Track and report illnesses
- Implement criteria for suspending work based on wind, dust conditions
- Stay upwind of digging, dumping, drilling, blasting
- Keep windows closed and use air conditioning on recirculate



Recommendations: Personal Protective Equipment

- Implement respiratory protection program
- Consider use of NIOSH approved respirators when
  - Conducting soil disturbing work
  - During high winds
  - Working in trenches
- Consider use of coveralls and dedicated work boots



Knowledge gaps

- Occupational burden of valley fever:
  - Routine collection of industry and occupation in case reports
  - Underestimates of true burden
  - Disparate systems: case report forms, employee rosters, employer records, workers compensation claims
- Role of air and soil sampling
- Role of skin tests (test characteristics)
- Effectiveness of interventions to minimize exposures
  - Environmental mitigation (e.g. soil stabilizers)
  - Respiratory protection
- How wind speed, dust levels, other metrics might be used as triggers for temporarily stopping work or increasing control measures

Summary

- Valley fever is an important occupational infectious disease, leading to morbidity, missed work time, healthcare costs
- People who work outdoors in endemic areas and disrupt soil or work in dusty or windy conditions are at increased risk of infection
- Considering occupational risk factors and controlling exposures among workers according to the hierarchy of controls will help prevent disease transmission in the workplace

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